An anatomical illustration of the human circulatory system. A semi-transparent human torso is shown, revealing the heart and the network of arteries and veins. The heart is centrally located, with red arteries branching out to the left and right sides of the body, and blue veins returning blood to the heart. The background is a deep red, filled with numerous red blood cells of varying sizes, some in sharp focus and others blurred, creating a sense of depth and movement. The overall color palette is dominated by reds and blues, emphasizing the blood and its flow.

Blood Vessels
SBI 3U



Parts of the Closed Circulatory System:

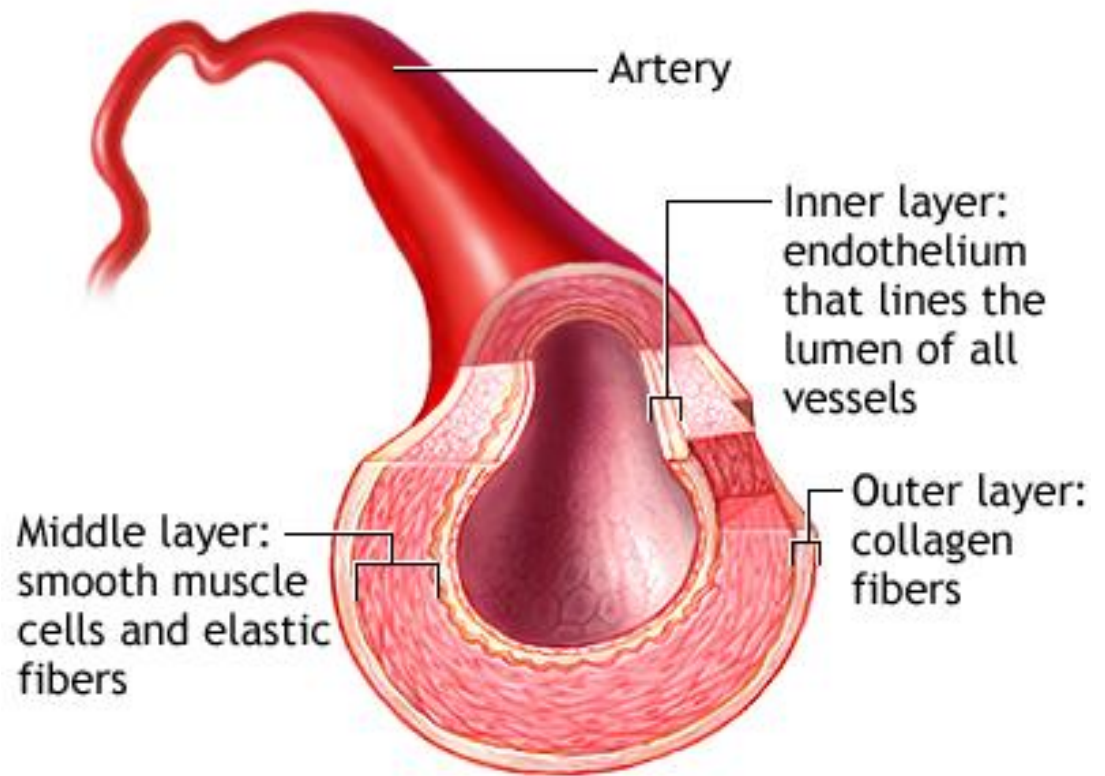
The main parts of the circulatory system are:

- **Heart:** muscular organ which pumps blood throughout the body
 - **Arteries:** carry blood away from the heart; branch into arterioles.
 - **Veins:** carry blood to the heart; branch into venules.
 - **Capillaries & Capillary beds:** the site of exchange between the surrounding tissues and the blood
 - **Blood:** the fluid within the vessels
- ** (Kidneys-an accessory organ: filters the blood and removes wastes) ****

The Blood Vessels

Arteries:

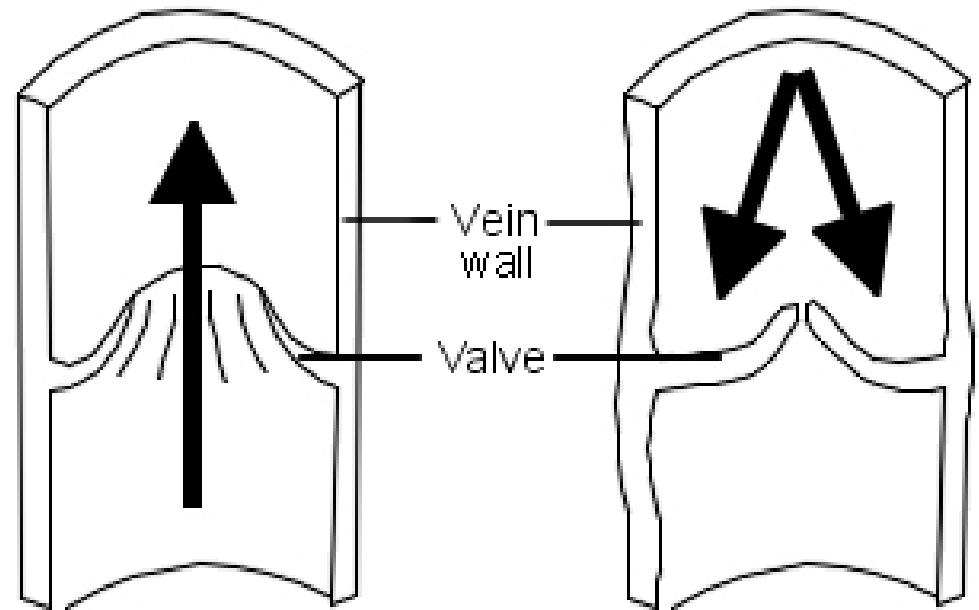
- Carry blood away from the heart
- Have a thicker layer of smooth muscle to withstand the pressure of blood flow
- Smaller branches are called arterioles



The Blood Vessels

Veins:

- Carry blood to the heart
- Have valves so that there is no backflow and blood does not pool in extremities
- Smaller branches are called venules
- Venous valves and skeletal muscle work together in a low-pressure system to move blood back to the heart



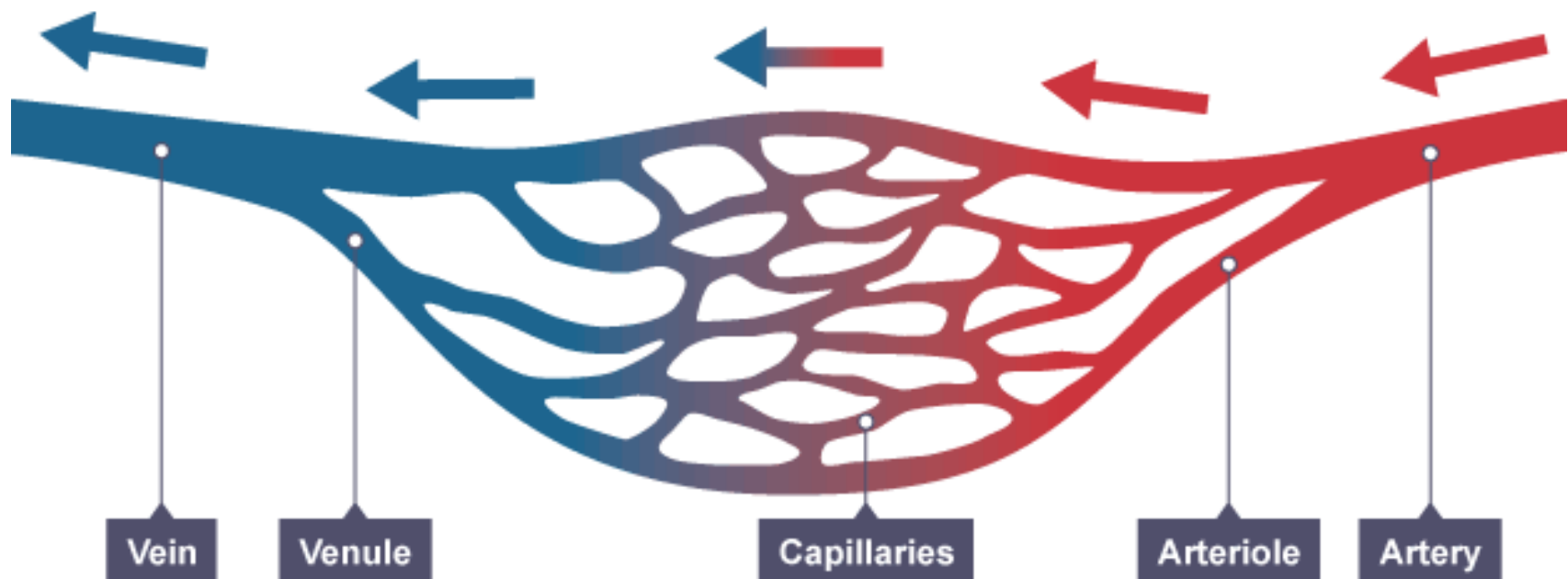
Healthy Venous Valves

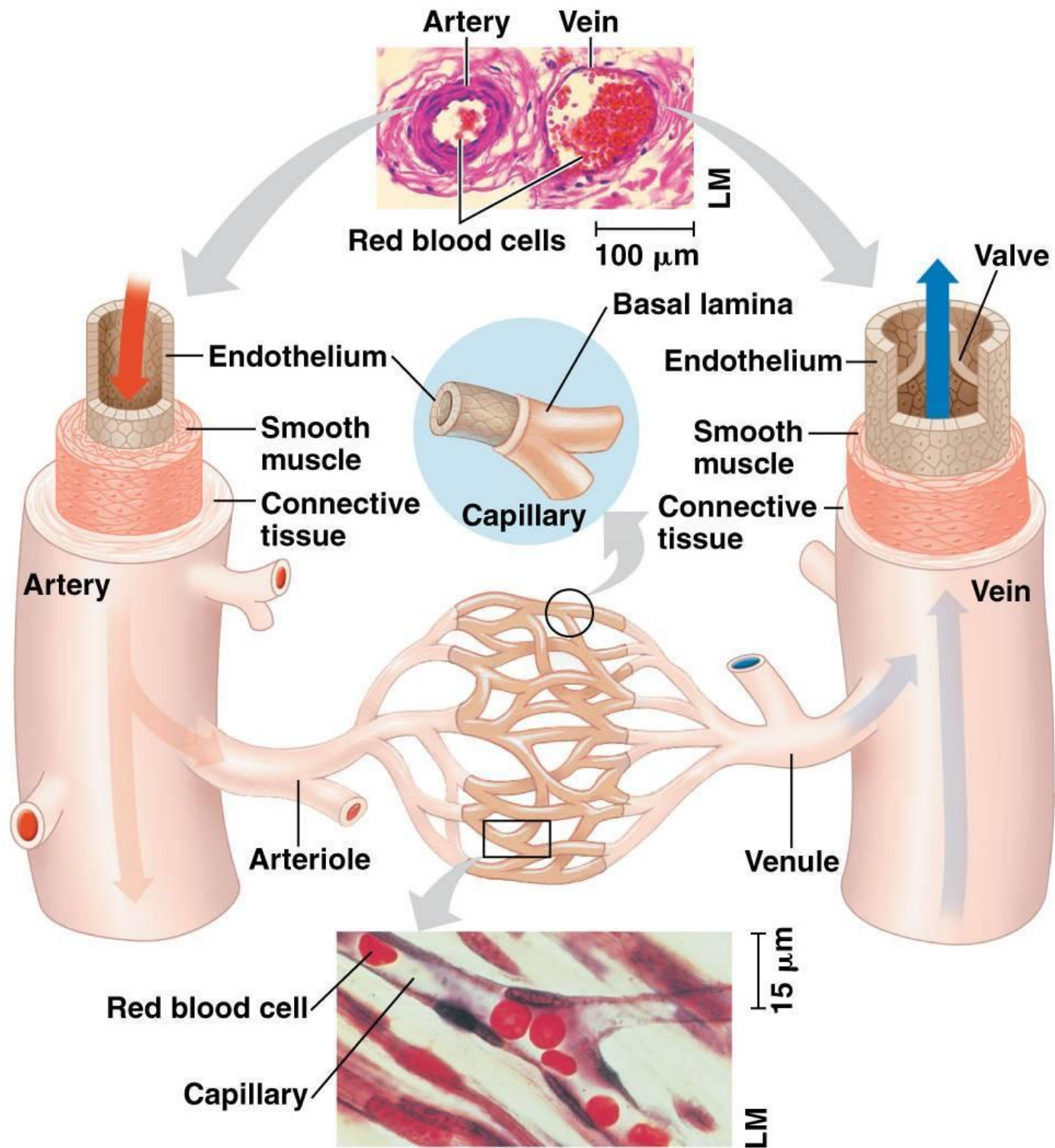
Venous blood flows upward against gravity and any backflow is prevented by valves that shut against the flow

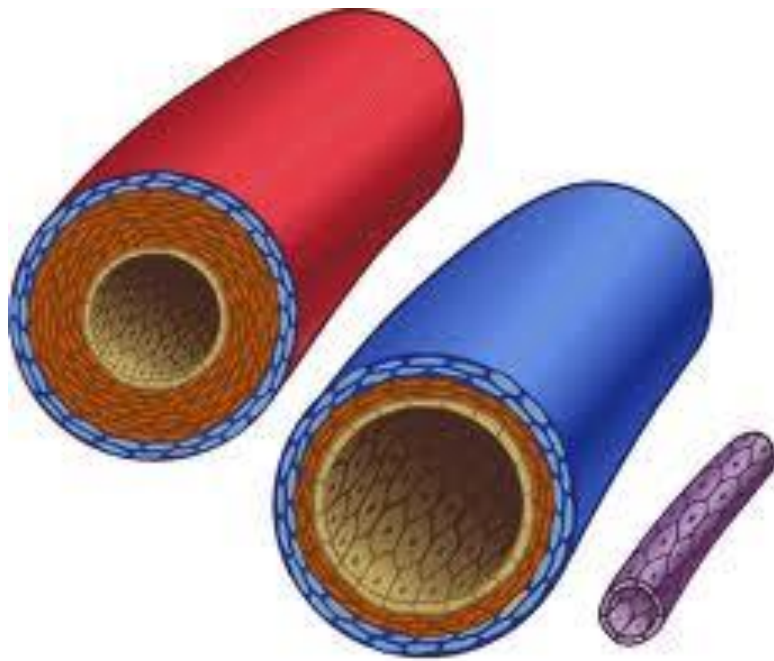
The Blood Vessels

Capillaries:

- Connect arteries and veins
- Capillary beds are made up of many capillaries together (like a net)
- Are only one cell thick



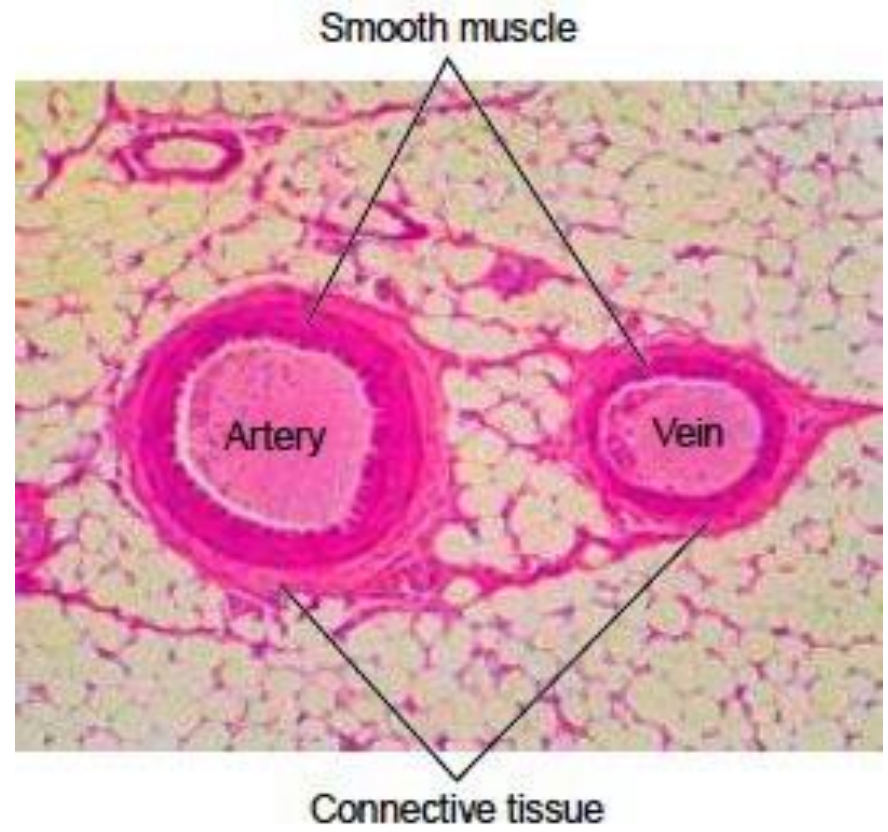




Artery

Vein

Capillary



Body Worlds



The Blood Vessels

Blood Vessels can regulate Body Temperature

- Blood passes from arteries to arterioles.
- The center of arterioles are composed of elastic fibers and smooth muscle (can't control this).
- Nervous system and blood vessels regulate temperature
- Nerve impulses can cause the smooth muscle to either contract or relax.
- Some vessels are slightly constricted when not needed (i.e. those that feed muscles)

A glowing blue ECG line graphic runs horizontally across the top of the slide, set against a dark background with a faint grid. The title 'The Blood Vessels' is written in white text to the right of the ECG line.

The Blood Vessels

Vasoconstriction (cold)

Normal 36.5–37.5 °C

- Muscles constrict the vessels
- Decrease blood flow to tissues.
- Less blood to extremities to keep the core warm
- As a result blood pressure increases
- Hypothermia < 35.0 °C

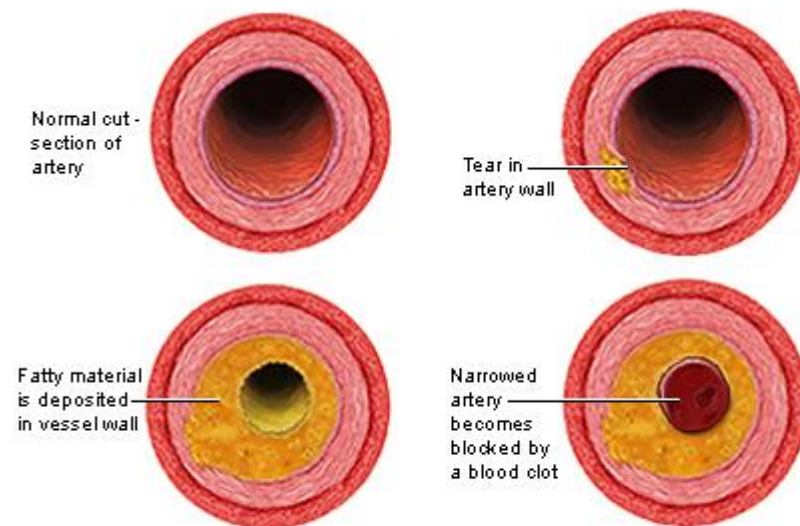
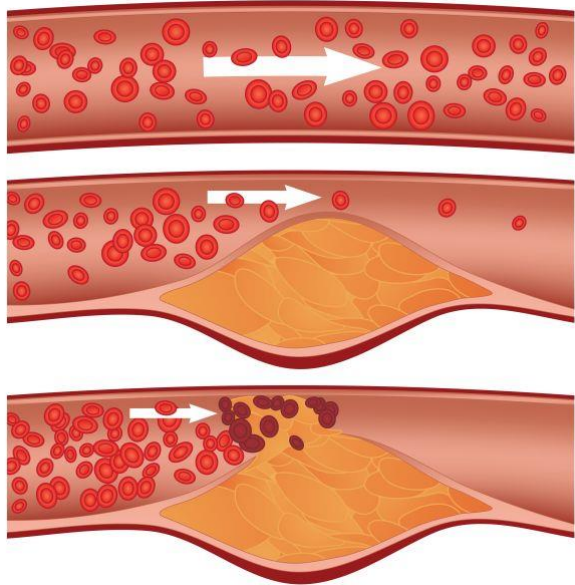
Vasodilation (hot)

- Smooth muscle relax
- Vessels dilate
- Helps blood flow to surface of tissue so it can cool
- As a result blood pressure decreases (faint when hot)
- Hyperthermia > 37.5 or 38.3 °C

The Blood Vessels

Atherosclerosis

- #1 killer of Canadians – heart disease
- Cholesterol/fat – sticks to the edge of vessels (arteries)
- Called “plaque”
- Leads to heart attack → ruptured artery



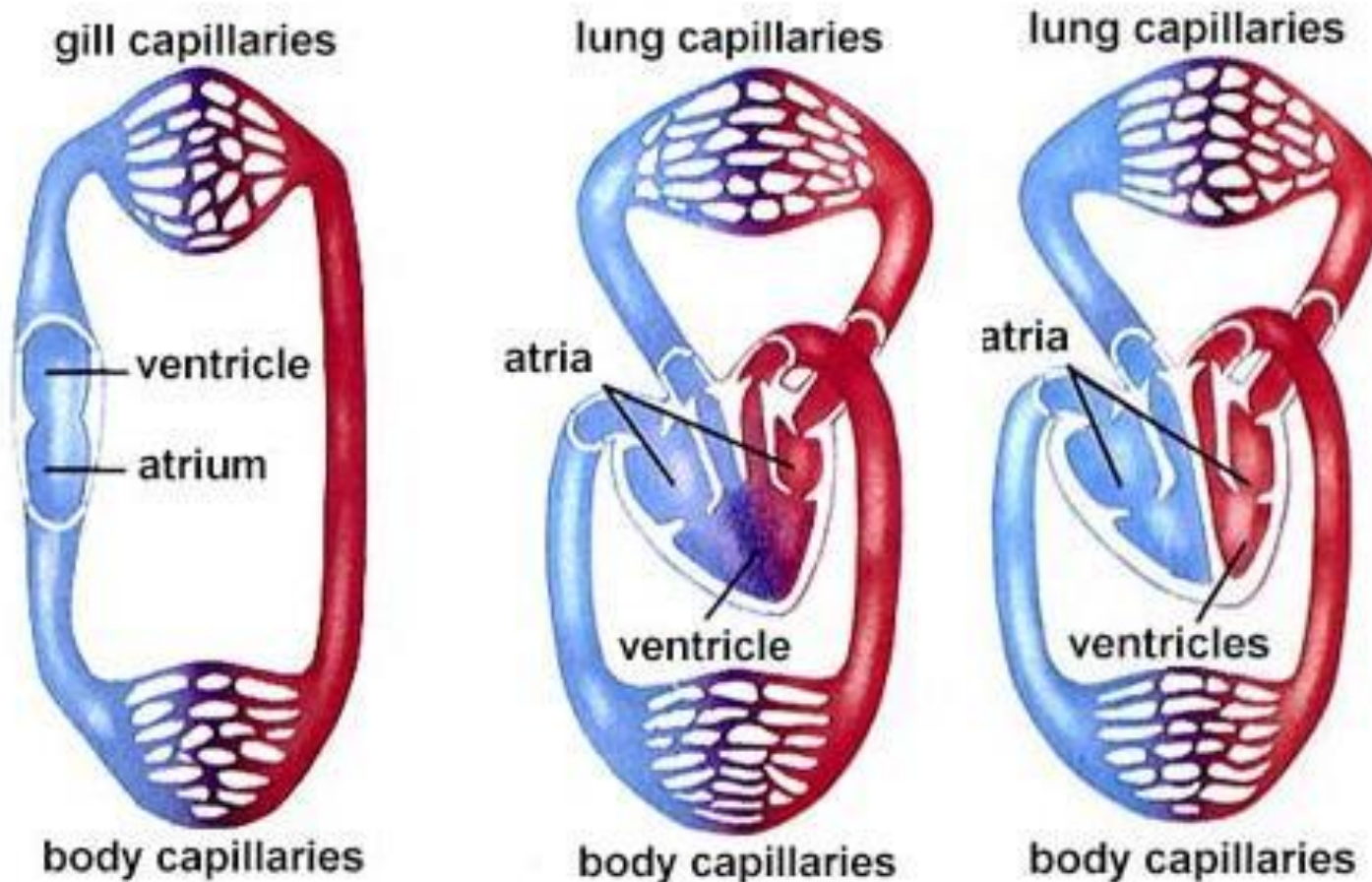
The Heart

- The heart's main function is to pump blood throughout the body of the organism.
- The heart is a muscle and is also connected to its own set of blood vessels
- The heart contains “pacemaker” cells that regulate the contractions of the heart muscle



Types of Hearts

There are three types of structures of hearts: 2, 3 and 4 chambered



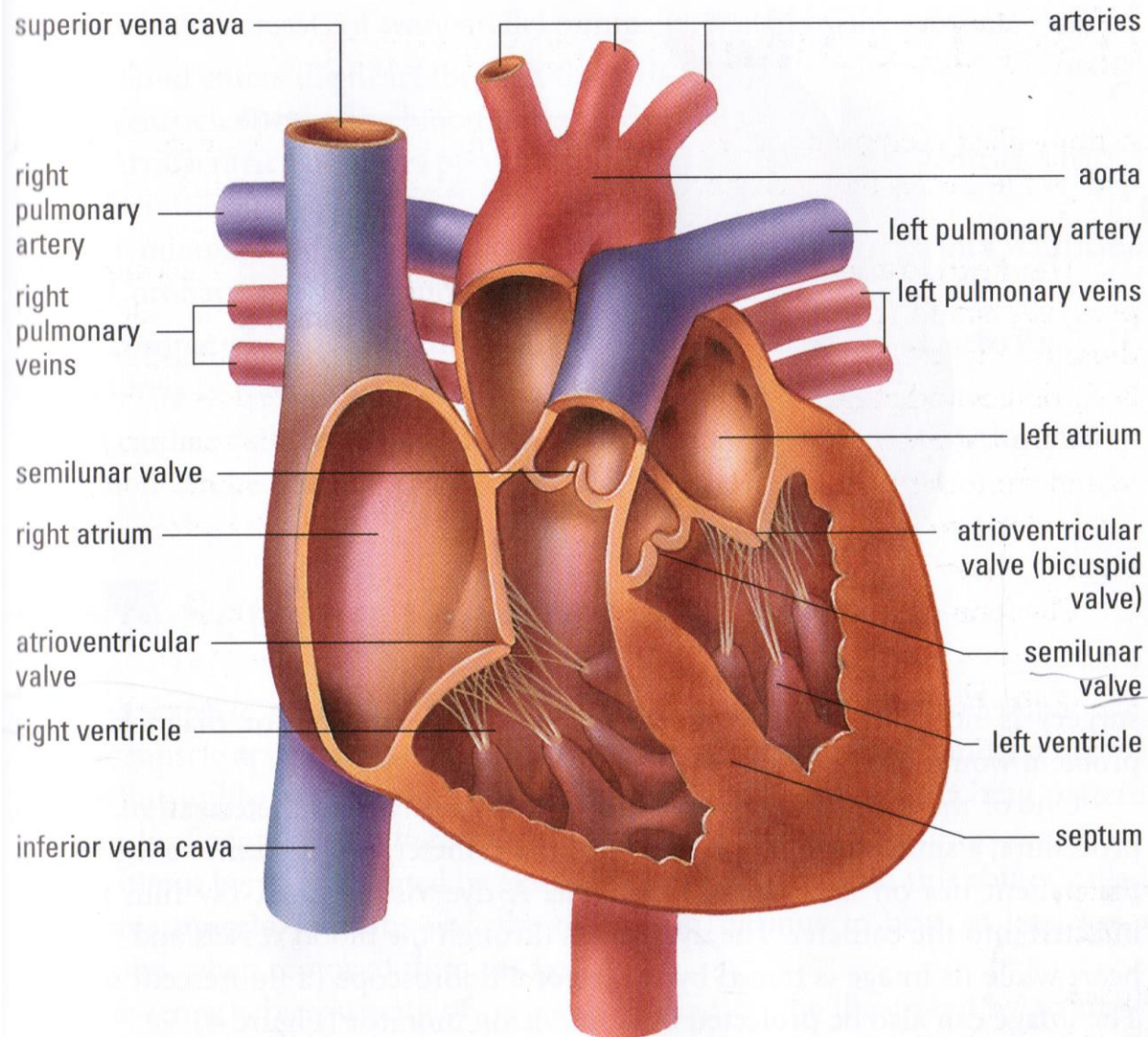


Types of Hearts

There are three types of structures of hearts: 2, 3 and 4 chambered

- In circulatory systems that contain a 2- or 4-chambered heart, deoxygenated and oxygenated blood are separated from each other.
- In circulatory systems that contain 3-chambered hearts, there is only one ventricle, so deoxygenated and oxygenated blood mix.

The Mammalian Heart





The Mammalian Heart

- A fluid-filled membrane called the **pericardium** surrounds the heart.
- The fluid bathes the heart preventing friction.
- Heart consists of two parallel pumps separated by the **septum**, each with an **atrium** and a **ventricle**.
- Pumping action is synchronized (mirrored).
- Right side – from tissue to lungs (deoxygenated)
- Left side – from lungs to cells (oxygenated)



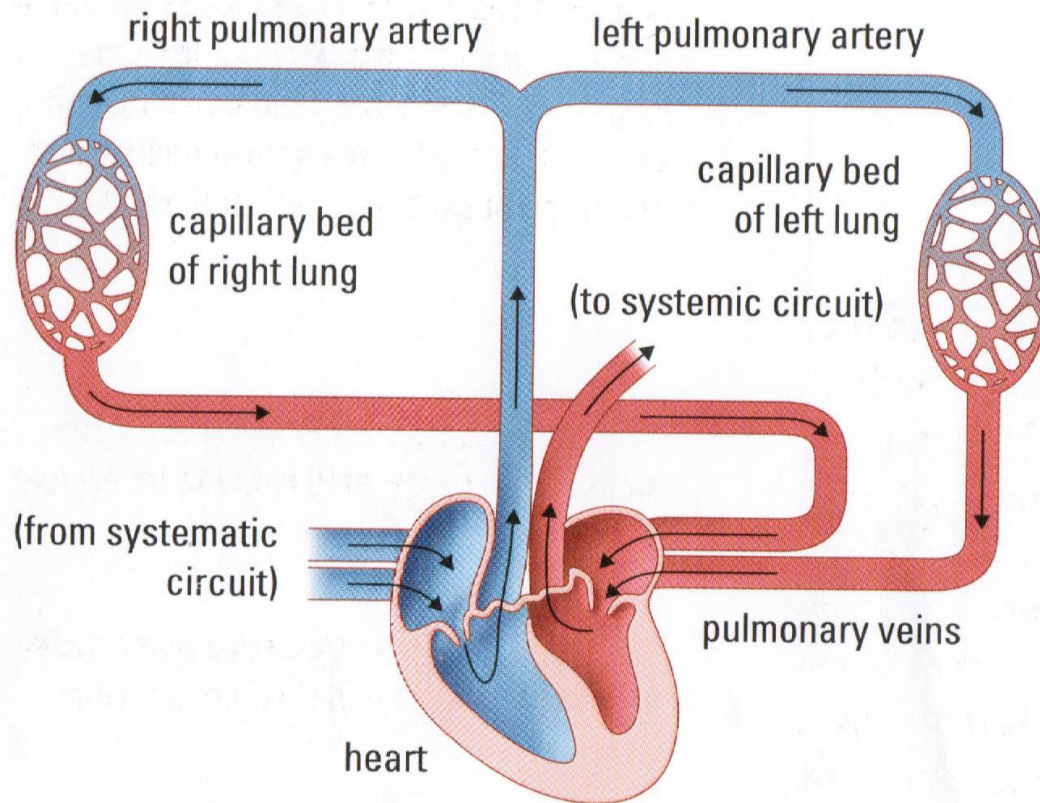
The Mammalian Heart

- The atria, located at the top of the heart, receives blood and pumps it into the ventricles.
- The ventricles, located at the bottom of the heart, pump blood out into two circuits.
 - Right side – pulmonary circuit
 - Left side – systemic circuit
- Ventricles have thick muscular walls to pump blood over long distances and through capillaries.

The Mammalian Heart

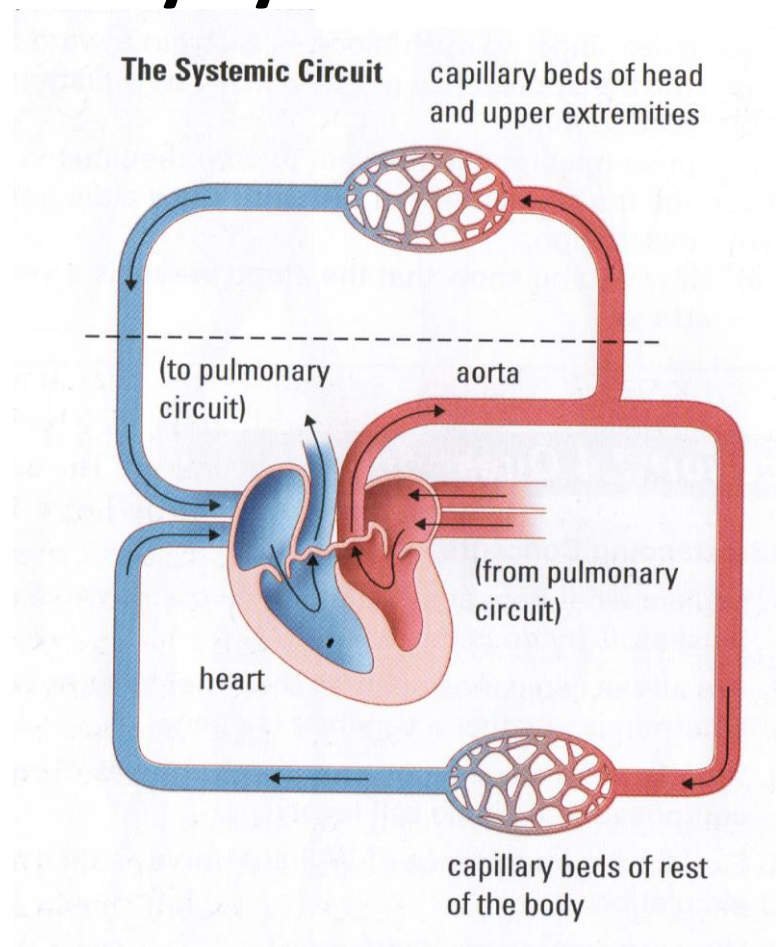
Pulmonary circulatory system – blood to and from lungs

The Pulmonary Circuit



The Mammalian Heart

Systemic circulatory system – blood to and from lungs



Veins

- Large volume (65% blood)
- Low pressure
- take bring blood back to the heart (deoxygenated blood)
- valves
- Less oxygen
- Blue colour

Exception

The Pulmonary circuit

- Arteries (deoxygenated blood) – looks blue
- Veins (oxygenated blood) – looks red

[Video](#)

Arteries

- Low volume (15% blood)
- High pressure
- take blood away from heart (oxygenated blood)
- No values
- More oxygen
- Red colour